Bi-weekly Seismic Call Meeting Minutes

Date: 2016-05-18

Topics:

1. RAI 199-8223, Question 03.08.01-13

KHNP is to provide to the NRC a markup of DCD Tier 2, Section 3.8.1.6.3 which specifies the manufacturer and product designation of the tendon and anchorage system. KHNP has revised the response to include a change to the DCD which will add the manufacturer and product designation of the tendon and anchorage system in Section 3.8.1.6.3.

Notes From 5/03/2016 Call:

The following three items need to be included in the draft response to be reviewed in the next scheduled call:

a.) Add as an attachment, the English version of the current Attachment 2 that was sent to the NRC on April 19, 2016 and provide a discussion in the response section on the reason for the two versions.

b.) Contact the vendor to provide an explanation of why maximum is used in the definition of X_R and clarify the equation listed underneath the definition. The current equation's use of a colon is not normal nomenclature. The NRC's concern is that the vendor might have used testing to determine X_R and though the ASME Code allows calculating the distance, it might not be the most appropriate approach. A comparison might be needed between the values specified by the vendor and the calculated values.

c.) KHNP needs to verify that only ferrous duct material is used since the footnote at the bottom of the table is ambiguous and could mean that other materials can be used; some of which are not desirable. If ferrous material is the only material used in the APR1400, then it needs to be stated in the DCD and response.

KHNP INPUT

KHNP has revised the draft revised response to include the three items discussed above. See attachment 1.

Notes From 5/18/2016 Call:

NRC stated that on a quick review, the draft response appears to have all of the information requested, but will review it more thoroughly over the next few weeks and discuss the results of their review on the next bi-weekly call.

2. **RAI 252-8299, Question 03.07.02-7**

KHNP is to determine what slabs have been included in the live load study, re-perform the study if all slabs have not been included, and revise the RAI response to describe the modeling of all slabs and discuss the treatment of live loads with regard to those slabs (justify if excluded).

KHNP INPUT

The walls in the reactor containment building are not a main issue of this RAI. Since more studies are needed to resolve the NRC staff's concerns about the slabs in the reactor containment building, it is expected that the response to the NRC comments and the revised response to the RAI cannot be provided before next seismic call. Therefore, it is requested that this item is discussed in the seismic call meeting after next.

Notes From 5/18/2016 Call:

The NRC re-iterated some of the points from the last call that need to be included in the KHNP review of the issue, including: local effects of the wall to slab interface, assurance that the mesh refinement is adequate, and the process to capture out-of-plane amplification. The NRC is interested in having the connection details of the secondary shield wall and containment wall to floor slab.

3. **RAI 183-8197, Question 03.07.02-4**

KHNP is to provide the revised response which includes the EDGB & DFOT.

KHNP INPUT

KHNP is experiencing technical challenges. An investigation of how previous applicants have resolved contact ratio issues is underway. KHNP anticipates being able to provide a draft due date during the next bi-weekly call on 2016-05-18.

Notes From 5/3/2016 call:

The staff reiterated that they agree with the methodology used for the nuclear island and expects that the same be used for the EDGB and DFOT. They understand that the technical challenges have been resolved and will look forward to reviewing the draft response soon.

Notes From 5/18/2016 call:
KEPCO E&C is still evaluating the EDGB and DFOT and plan on completing the evaluation the first week in June.

4. RAI 199-8223, Q 03.08.01-9

The draft revised RAI response was provided to the NRC staff on April 19. The markup of DCD Section 3.8.2.7 has been added in the revised response.

Notes From 5/3/2016 Call:
Similar wording for inspection and testing that was added to 3.8.1 for the concrete needs to be added to Section 3.8.2 for the steel portions of containment. The NRC reviewers have passed this section on to the Chapter 6 reviewers and will provide any comments that they might have.

Notes Form 5/18/2016 Call
KHNP still needs to provide a markup of Section 3.8.2. The second sentence of the first insert to 3.8.1 needs to be added to 3.8.2 along with the leakage test portion of the second insert. KHNP to provide a draft of the markup.

5. RAI 255-8285, Question 03.08.05-7, 9, 18

KHNP INPUT

KHNP would like to discuss the response approach for RAI 255-8285 Question 03.08.05-7 regarding the work scope of the evaluation of settlement due to construction sequences.

1. Under the site properties in DCD Table 3.7A-1, the construction sequence analysis will not affect the design of the basemat and superstructure. Because the settlement is dependent on the amount of applied load when considering sand characteristics, the settlement during construction will be smaller than the settlement under the as-built condition described in the technical report.

2. If the construction sequence is necessary to check item 1, KHNP plans to execute the construction sequence analysis based on the following assumptions. Confirmation that the NRC staff agrees that the assumptions are reasonable before work begins is desired.

   1) The site properties described in DCD 3.7A-1 are used in the construction sequence analysis.

2) Based on assumption 1), the short-term settlement will be checked and considered.
3) The analysis will use the construction sequence of Shin-Kori units 3,4 instead of the actual construction sequence which would be specified by a COLA.
4) If the settlement for the construction sequence does not exceed the allowable settlement presented in DCD Table 2.0-1, the effects on the design for the seismic category I structures due to the construction sequence analysis will not be accounted for.

Notes From 5/3/2016 Call:
KHNP needs to review the NRC comments that were recently transmitted and incorporate any necessary changes into the response. NRC stated that RAI Questions 7, 9, and 18 need to be responded to concurrently since the material is related as they have provided comments together.

KHNP INPUT
KHNP will be provided the draft response for NRC feedback of Question 03.08.05-7, 9, and 18 by 2016-05-16.

Notes From 5/18/2016 Call:
Draft of response was recently completed and is in review and will be sent to NRC shortly.

6. RAI 255-8285, Question 03.08.05-16

KHNP INPUT
KHNP has provided a draft revised response to address issues regarding the static elastic modulus, as discussed during the December 2015 meeting. KHNP would like to hear any feedback the NRC staff might have to offer.

Notes From 5/3/2016 Call:
NRC will review our responses that were recently provided and respond shortly.

Notes From 5/18/2016 Call:
NRC is still reviewing the response and will discuss the results in the next scheduled call.

11. RAI Schedule Slips
KHNP is to determine the level of confidence in a positive outcome and the risks associated with a negative outcome (body of work to

be performed and schedule of that work should there be a negative outcome) for RAI 182-8160, Question 03.07.01-3. KHNP is to determine why a revised due date of 2016-06-03 has been provided for RAI 255-8285, Q 03.08.05-16 when a draft was provided to the NRC on 2016-04-19.

KHNP INPUT
KHNP is still evaluating the probability of a favorable outcome to the issues discussed in RAI 182-8160, Question 03.07.01-3, and the impacts of an unfavorable outcome. The draft provided to the NRC in response to RAI 255-8285, Q 03.08.05-16 is considered to be KHNP's final draft response, and no further work is being performed at this time. KHNP requested to move the final due date to 2016—06-03 so that multiple revisions to the final due date would not be necessary. However, KHNP hopes to produce a final response before that date, but finalization will be contingent upon the nature of feedback provided by the NRC staff.

Notes From 5/3/2016 Call:
KHNP stated that June 30, 2016 was provided due to the continuing parametric analyses that are being performed. Attempts will be made to better that schedule.

KHNP INPUT
An update on the preliminary results for the appropriateness of the time histories will be targeted for the next meeting.

Notes From 5/18/2016 Call:
Discussions were held on the verification efforts that the NRC has performed to date. It was stated that using the 5%-75% error method showed difficulties in yielding acceptable results in four out of six cases for the frequency ranges below ten hertz. However, if the methodology in NUREG 4357 is used, the results could be satisfactory. KHNP will continue to assess the appropriateness of the time histories.

12. RAI 182-8160, Question 03.07.01-1 and 2

1) draft response for Question 03.07.01-1 is prepared as shown in attachment 2.

Notes From 5/3/2016 Call:
For Question 1, the NRC reviewers had the following comments:
a.) In the response to (a)(3), the paragraph states what is done if there is a close match between the time history response spectra and the CSDRS, but it also needs to address if there

is not a close match. Similar language that is used in the last sentence of the added paragraph in the Attachment page 5 of 14 should be used in the response to this item also.

KHNP INPUT
The description is revised in the draft revised response to RAI.

Notes From 5/18/2016 Call:
The NRC was satisfied with the response.

Notes From 5/3/2016 Call:

b.) In comparing Figure 3.11 to 3.12 in the response to (b), it is stated in the response that it is very consistent with, but slightly lower in amplitude which does not appear to be accurate. The staff agrees that it is close, but cannot state without further justification that it is conservative. Change (delete slightly lower or higher, conservative) the description with an appropriate word such as "closely matched."

KHNP INPUT
The wording such as slightly lower or higher, conservative is revised as shown in the draft revised response to RAI.

Notes From 5/18/2016 Call:
The NRC was satisfied with the response.

Notes From 5/3/2016 Call:

c.) KHNP needs to specify a revised date in the response to (c).

KHNP INPUT
The response to (c) will be provided by June 30, 2016.

Notes From 5/18/2016 Call:
The response to the RAI can be submitted when the draft response to this sub-question is reviewed satisfactorily.

Notes From 5/3/2016 Call:

d.) KHNP needs to review the equation specified in response to (d) since it appears that $in^2/sec^4/rps$ should be divided by two times pi rather than multiplied.

KHNP INPUT
The equation in response to (d) is revised as comment.

Notes From 5/18/2016 Call:
The NRC was satisfied with the response.

Notes From 5/3/2016 Call:

e.) In the mark-ups on page 1 of 14 the first added paragraph, the use of conservative is not accurate. In the second added paragraph the first sentence, it is not clear what "30 time histories **of each of** the CRDRS compatible…" is referring to. Also the second sentence is not a complete sentence.

KHNP INPUT
The wording of "of each" is deleted.

Notes From 5/18/2016 Call:
The NRC was satisfied with the response.

Notes From 5/3/2016 Call:

f.) The wording of the added paragraph on page 3 of 14 needs to correlate to the revised wording in the response.

KHNP INPUT
The description is added in attachment to correlate to the revised wording in the response.

Notes From 5/18/2016 Call:
The NRC was satisfied with the response.

Notes From 5/3/2016 Call:

2) Question 2, the response provided appears to be appropriate, but the NRC requested that KHNP not finalize it until the NRC completes their confirmation.

Notes From 5/3/2016 Call:
One additional item that was discussed pertained to KHNP's response to Question 03.07.01-5. The low strain soil profiles were provided and the reviewers wanted to see the generic profiles. KHNP stated that these soil profiles would be provided by 5/11.

KHNP INPUT
The generic soil profiles will be provided as attachment of response to feedback of RAI 3.7.1-5. It will be provided by 5/16.

Notes From 5/18/2016 Call:
Soil profiles sent 5/17 and will be reviewed by NRC.

Other items discussed on 5/18/2016 call

RAI 03.07.11-2

NRC has looked at the seed records and spectra and agree in general. They will continue to review.

RAI 8299 03.07.02-8

Response is adequate; however, a few editorial issues: 1) The table element on page 6 of 9, last row, third column, the value of -28.7 is not consistent with the other results and may be an error in the addition of two numbers, 2) There appears to be slight differences in values provided due inconsistencies in rounding (ex. element 10279 last row)

RAI 8300 03.07.01-5

Responses to sub-items 1, 2 and 3 in the provided update sheet are satisfactory. It was stated by the reviewer that the RAI draft response for part b), second paragraph, second sentence pertaining to the explanation of the large dips in the site response transfer functions is not an accurate reflection of the intentions of KHNP. It appears the intent is to state that the transfer function of the NI is lower than the EDGB across all frequencies. KHNP will revise the wording and send the revised paragraph to the NRC.

Outstanding Draft RAI Responses

RAI	Question	Draft Due Date	Draft Provided	Feedback Provided	Action With
182-8160	03.07.01-4	TBD	4/6/2016	5/18/2016	KHNP; send
182-8160	03.07.01-1	TBD	4/29/2016	5/18/2016	KHNP; need item 'c'
182-8160	03.07.01-2	N/A	4/29/2016	N	NRC
252-8299	03.07.02-7e	7/31/2016	N	N/A	KHNP
252-8299	03.07.02-7 item a.)i.)	TBD	4/29/2016	04/29/2016	KHNP
252-8299	03.07.02-9	5/27/2016	N	N/A	KHNP
252-8299	03.07.02-10	5/31/2016	N	4/20/2016	KHNP
252-8299	03.07.02-11	7/31/2016	N	N/A	KHNP
129-8085	03.08.01-1	N/A	5/17/2016	N	NRC
129-8085	03.08.01-2	N/A	4/29/2016	N	NRC
129-8085	03.08.01-4	N/A	4/20/2016	N	NRC
129-8085	03.08.01-5	N/A	4/29/2016	4/20/2016	KHNP
226-8235	03.07.02-5	N/A	4/27/2016	N	NRC
226-8235	03.07.02-6	8/12/2016	N	N/A	KHNP
183-8197	03.07.02-1	8/12/2016	N	N/A	KHNP
183-8197	03.07.02-4	5/13/2016	5/17/2016	4/6/2016	NRC
199-8223	03.08.01-8	6/3/2016	N	N/A	KHNP
199-8223	03.08.01-9	TBD	N/A	5/18/2016	KHNP
199-8223	03.08.01-10	N/A	4/28/2016	N	NRC

199-8223	03.08.01-13	N/A	4/28/2016	N	NRC
200-8225	03.08.02-2	TBD	4/4/2016	4/29/2016	KHNP
227-8274	03.08.04-3	TBD	5/3/2016	5/4/2016	KHNP
267-8301	03.07.03-1	5/4/2016	N	N/A	KHNP; send
208-8245	03.08.03-5	TBD	N	4/29/2016	KHNP
255-8285	03.08.05-7	TBD	N	4/29/2016	KHNP; send
255-8285	03.08.05-9	TBD	N	4/29/2016	KHNP; send
255-8285	03.08.05-16	N/A	4/19/2016	N	NRC
255-8285	03.08.05-18	N/A	3/21/2016	4/29/2016	KHNP; send
253-8300	03.07.01-5	TBD	5/17/2016	5/18/2016	KHNP
253-8300	03.07.01-8	N/A	4/4/2016	5/4/2016	KHNP

Other RAI status

RAI	Question	Comment
227-8274	03.08.04-4	KHNP to send revised draft Rev. 2
208-8245	03.08.03-1	Need date for supplemental response
208-8245	03.08.03-3	Need revised submittal date
208-8245	03.08.03-4	Need revised submittal date
208-8245	03.08.03-6	Need revised submittal date
208-8245	03.08.03-7	Need revised submittal date
208-8245	03.08.03-8	Need revised submittal date
267-8301	03.07.03-2	Need revised submittal date
267-8301	03.07.03-3	Feedback provided on 5/14/2016
267-8301	03.07.03-5	Need revised submittal date
199-8223	03.08.01-15	Need to understand issue for supplement
255-8285	03.08.05-1	Need to understand unresolved closed issue
255-8285	03.08.05-4	Need to understand unresolved closed issue
255-8285	03.08.05-8	Need revised submittal date
255-8285	03.08.05-13	Need to understand unresolved closed issue
255-8285	03.08.05-14	Need to understand unresolved closed issue
255-8285	03.08.05-17	Need to understand unresolved closed issue
255-8285	03.08.05-19	Need to understand unresolved closed issue